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TRANSMISSION MONITORING AND CONTROL (TRAMCON)  
SEGMENTATION PLAN FOR THE D. (U) DEFENSE COMMUNICATIONS  
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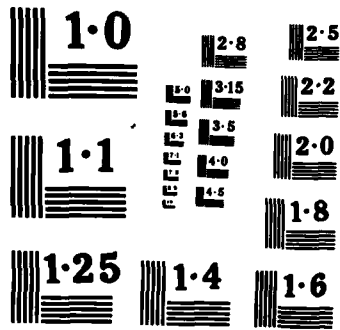
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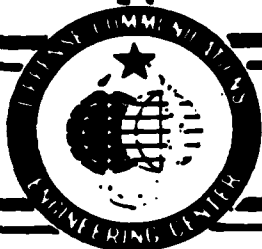
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**TR 6-85**



**DEFENSE COMMUNICATIONS ENGINEERING CENTER**

**AD-A154 175**

**TECHNICAL REPORT NO. 6-85**

**TRANSMISSION MONITORING AND  
CONTROL (TRAMCON) SEGMENTATION  
PLAN FOR THE DCS DIGITAL  
TRANSMISSION NETWORK**

**MARCH 1985**

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<p>The Transmission Monitoring and Control (TRAMCON) application criteria for the (DCS) Digital Transmission Network and the segmentation design for Europe are documented in this report. The Europe network is divided into 31 segments, each segment controlled by a master terminal (TMT) which receives transmission equipment and station data from Intelligent Remote Units (IRUs) located at all nodes of the segment. The considerations influencing the design are described; network geographical-link distribution, Facility Control Office (FCO) locations, backup mastership availability, allowable number of link terminations per segment and the ability to maintain node monitoring and reporting in spite of possible link outages. In many cases, link outages can be circumvented by judicious placement of primary and alternate masters. Since changes are to be expected in FCO designations and in segment configuration, future drawing revisions are likely.</p> <p><i>9.1.1.1, Digital Transmission Network Project, Walter Bonia</i></p>					
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TECHNICAL REPORT NO. 6-85  
TRANSMISSION MONITORING AND CONTROL (TRAMCON) SEGMENTATION  
PLAN FOR THE DCS DIGITAL TRANSMISSION NETWORK


MARCH 1985

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FOREWORD

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## EXECUTIVE SUMMARY

The Transmission Monitoring and Control (TRAMCON) application criteria for the Defense Communications System (DCS) digital transmission networks and the segmentation design for the Digital European Backbone (DEB) are documented in this Technical Report. For monitoring and control purposes the DEB is divided into thirty-one segments, each segment controlled by a primary TRAMCON Master Terminal (TMT) and each limited to a manageable number of sites or nodes. All nodes are equipped with Intelligent Remote Units (IRUs) for monitoring transmission and station equipment, including those designated as primary TMT locations. Additionally, the IRUs perform data processing and thereby are able to send concise information to the TMT when interrogated.

The TMT of each segment is backed up by an alternate counterpart in another segment which can take over the primary duties in whole or in part when the primary cannot function or when a segment link is inoperable. Thus, each TMT has two active data bases and will generally fill both a primary function for its own segment and a backup function for another segment.

The segmentation is designed taking into account the parameters of network geographical distribution, Facility Control Office (FCO) locations, backup mastership availability, allowable number of link terminations per segment and the ability of the design to maintain node monitoring and reporting in spite of possible link outages. Each TMT polls the IRUs in its own segment for information at least every 30 seconds. Polling and the ensuing IRU data response are restricted to the particular segment being monitored. To accomplish this intrasegment operation, software-controlled stopgates are used to disconnect IRU digital bridge ports for preventing link connections to another segment. Whenever it may become necessary to reactivate the link path, the stopgate can be opened by TMT command. Stopgates are also used to open closed link-node loops within segments which otherwise would result in undesired circulating TMT and IRU data signals.

Link outages can be overcome by judicious placement of primary and alternate masters; however, dead-end strings of nodes called "tails" will cause node isolation upon link failure.

The estimated uninstalled equipment cost for the TRAMCON subsystem in Europe is \$9.4 million. This cost includes 31 TMTs for the 31 segments, 243 IRUs monitoring 523 link terminations at 223 locations in eight countries, and 63 Remote Display Terminals (RDTs). An RDT at a remote location enables mobile maintenance teams to access information at the TMT on a dial-up basis.

Since the TRAMCON program is world-wide in nature, future revisions of this report will contain TRAMCON application information for the Pacific and Western Hemisphere areas.



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## I. INTRODUCTION

The Defense Communications System is continuing to transition from analog transmission and switching to a digital-based technology. The current transitional phase, which is planned to continue through 1992, is making available the operational and economic benefits of digital technology to voice, video and data communications in the DCS as exemplified in the developing Defense Switched Network (DSN), Defense Data Network (DDN) and the DCS digital transmission network.

The same digital processing techniques now being used for transmission can also be applied to monitor the transmission system itself. The first operational system for monitoring DCS digital transmission networks was the interim Enhanced Fault Alarm System (EFAS) installed in Europe at the 13 DEB-1 nodes from Coltano, Italy to Vaihingen, Germany. The EFAS consisted of a computer at a master location which collected data by polling a certain number of nodes within a predetermined sector called a segment. During a tri-service DCA management meeting in July 1981, a decision was made to develop a TRAMCON subsystem modeled after EFAS but with significant operational and logistic advantages including reduced manpower requirements. TRAMCON will employ one or more IRUs at all sites, permitting data processing and control at each of the nodes that was not previously available with the interim EFAS. For TRAMCON purposes, the transmission network will be divided into groups of nodes called segments. Control of all IRUs within a segment will be exercised by a TMT.

The first operational installation of TRAMCON will function with DEB III in the UK, with a scheduled IOC of April 1986. As part of the the overall planning for TRAMCON installation, DCEC Code R210 was tasked (reference [1]) by DCA Code B420 to develop segmentation plans for the DCS digital transmission networks in Europe, the Pacific area, and the Western Hemisphere, both CONUS and OCONUS. The TRAMCON segmentation plan for the Europe DCS digital transmission network is the subject of this Technical Report. Future revisions to the report will contain TRAMCON application information for the Pacific and Western Hemisphere areas.

## II. OBJECTIVE

The objective of this Technical Report is to document the TRAMCON Segmentation Plan for Europe, (Figure 1), Drawing No. 201032, Rev. A, 28 February 1985, for use by those involved in any area of the TRAMCON program from its development through operation and maintenance.\* The drawing conforms to the EURSEGRD option, as described by reference [2] and as selected in paragraph 2 of reference [3], with a master at Aviano. Note that the drawing is for planning purposes only, and if any conflict is discovered with other documents, DCEC Code R210 and DCA Code B420 should be notified. Since changes are to be expected in FCO designations and in segment configuration, future drawing revisions are likely. Change inputs should be provided, in writing, with marked prints to DCEC Code R210.

The segmentation structure of the enclosed Drawing No. 201032 is intended to develop effective transmission monitoring and control for the DCS digital network in Europe on an interrelated (primary/alternate master) segment basis. Each segment is limited to a manageable number of sites, or link terminations, and is controlled by a TMT generally collocated with a FCO. The rationale supporting the segmentation is described in the following sections. A brief description of TRAMCON operation is first given as an introduction to the rationale.

\* Full E-size prints or 17" x 22" reductions of Drawing No. 201032, Rev. A, are available from DCEC.

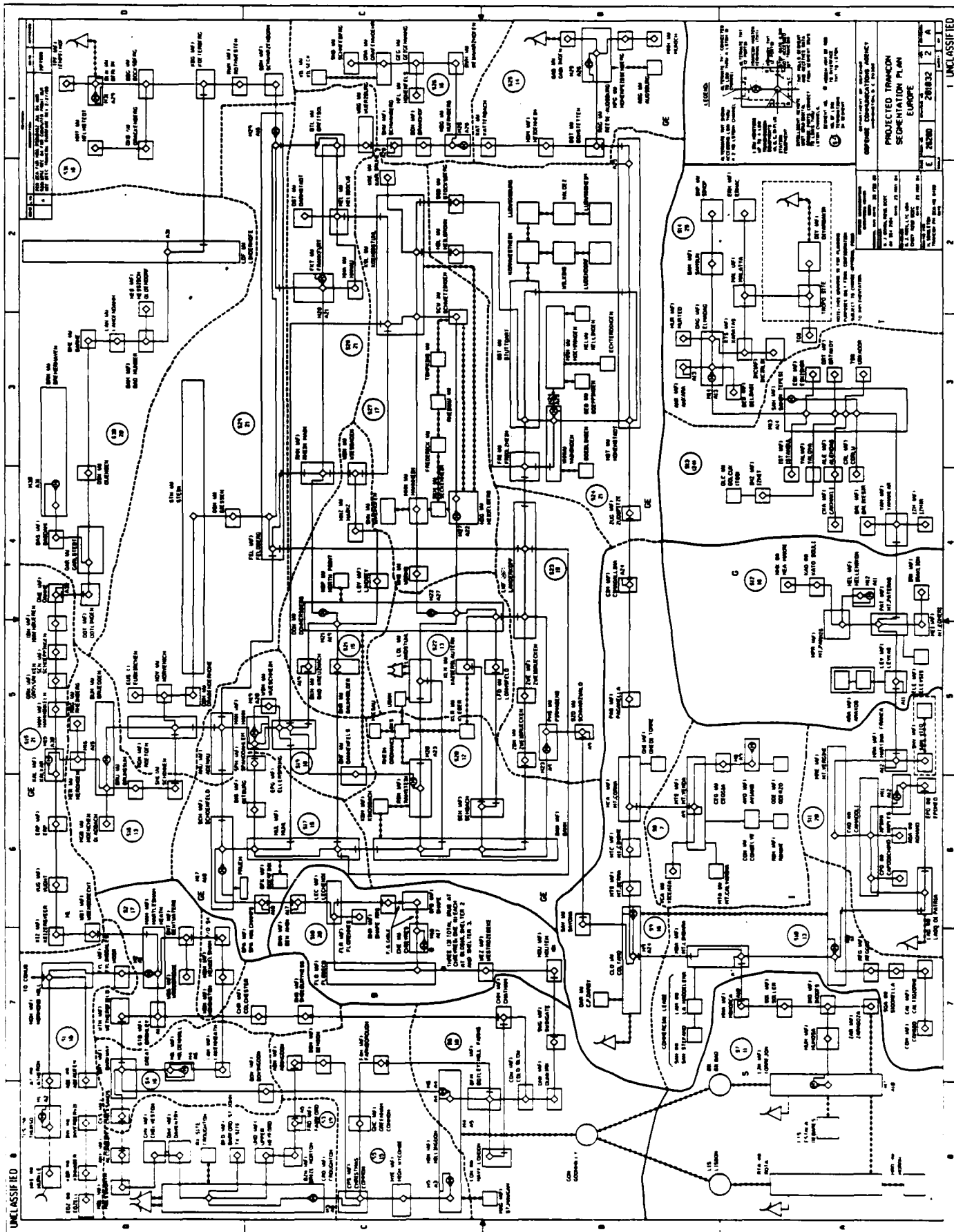


Figure 1. Projected TRAMCON Segmentation Plan, Europe

### III. BASIS FOR SEGMENTATION DESIGN

The TRAMCON segmentation drawing for Europe is based primarily on the TRAMCON Operational Concept, [4] and the connectivity drawing, [5]. The relevant features of TRAMCON system operation and of major equipments implementing the operational concept are described in the following paragraphs.

The basic unit of TRAMCON is a segment composed of a master station, generally a FCO, and a number of remote stations in a defined geographical region. The architecture is intended to implement the TRAMCON functions of station polling, alarm scanning, fault isolation, remote control, performance monitoring, information display and distribution, intra and intersegment master communications, and backup mastership for the DCS digital transmission networks. (See section 2 of reference [6] for details of system parameter measurements.) The segment is managed at the master station by a TMT which polls, and receives data from, an IRU. The TMT normally managing the segment is called the primary TMT. A TMT located in another segment shares responsibility for the segment in a backup, alternate role. Thus, each TMT will generally fill both a primary function for its own segment and a backup function for another segment. The TMT, therefore, has two active data bases - one for its primary function and the other for backup use. Two other data bases which are normally inactive are also resident in the TMT as reserves for possible future segment reconfiguration.

IRUs are located at every site including the TMT location. They monitor transmission equipment and site support equipment alarms and status indicators, and measure transmission system performance parameters. (See section 3 of reference [7]). An IRU consists of a Data Acquisition and Control Element (DACE), a Digital Bridge, and depending on the number of man-machine interfaces required at the IRU's site, two, one or no Local Display Terminals (LDTs). Site data processing is performed by the DACE and, upon request by the TMT, data are transferred from the remote IRU DACE through the IRU digital bridge to the 192 kb/s service channel bit stream via a Low Speed Time Division Multiplexer (LSTDM) card, and thence to the master station for display and storage at the TMT. (See Figure 2.) For attended sites, the IRU contains a Local Display Terminal (LDT), used both for local station data display and for operator keyboard entry. The IRU will not initiate information flow - it answers only when polled by the TMT. Each IRU can monitor up to four link terminations plus station equipment.

Under normal operating conditions, the TMT in its primary role will automatically and sequentially interrogate (poll) all IRUs within its segment at least every 30 seconds. This polling interval is determined by the protocols, polling rate, response rate, amount of data transferred, the number of stations, and the total number of link terminations in the segment. The sequence of events will be that the TRAMCON master issues a poll signal to each of its remote IRUs, in turn, and awaits the reply. As the reply is received, the next remote IRU is polled, and it sends a reply. Polling continues in this pattern.

The digital bridge portion of the DACE serves two functions: (1) as an element of the service channel bit stream, it repeats all transmissions received as input into any of its four service channel output ports; (2) as the service channel interface for the IRU, it acts as front end communication processor for the DACE. In this second function, it (1) notifies the DACE central processor of the receipt of any TMT message whose address corresponds to that of the IRU and makes those messages available to the central processor; (2) transmits response messages from the DACE on all output ports not subject to disconnection.

Disconnection of digital bridge output ports is shown in the segmentation drawing by "stopgates," preventing undesired party-line contention which would otherwise be created by TMT polling and DACE response messages circulating in adjoining segments. Another function of stopgates is to prevent the circulation of polling and data signals around link-node loops within a segment. The stopgates are activated through software control from the TMT.

The primary TMT interfaces with the collocated IRU digital bridge (Figure 2). The alternate TMT, however, interfaces with the LSTDM input to secure access to an IRU digital bridge in the adjoining segment.

A segment consists of no more than 21 link terminations, whenever possible. This figure is determined largely by the 30 second polling interval requirement, and to a lesser degree by the number of usable display lines on the LDT without scrolling.

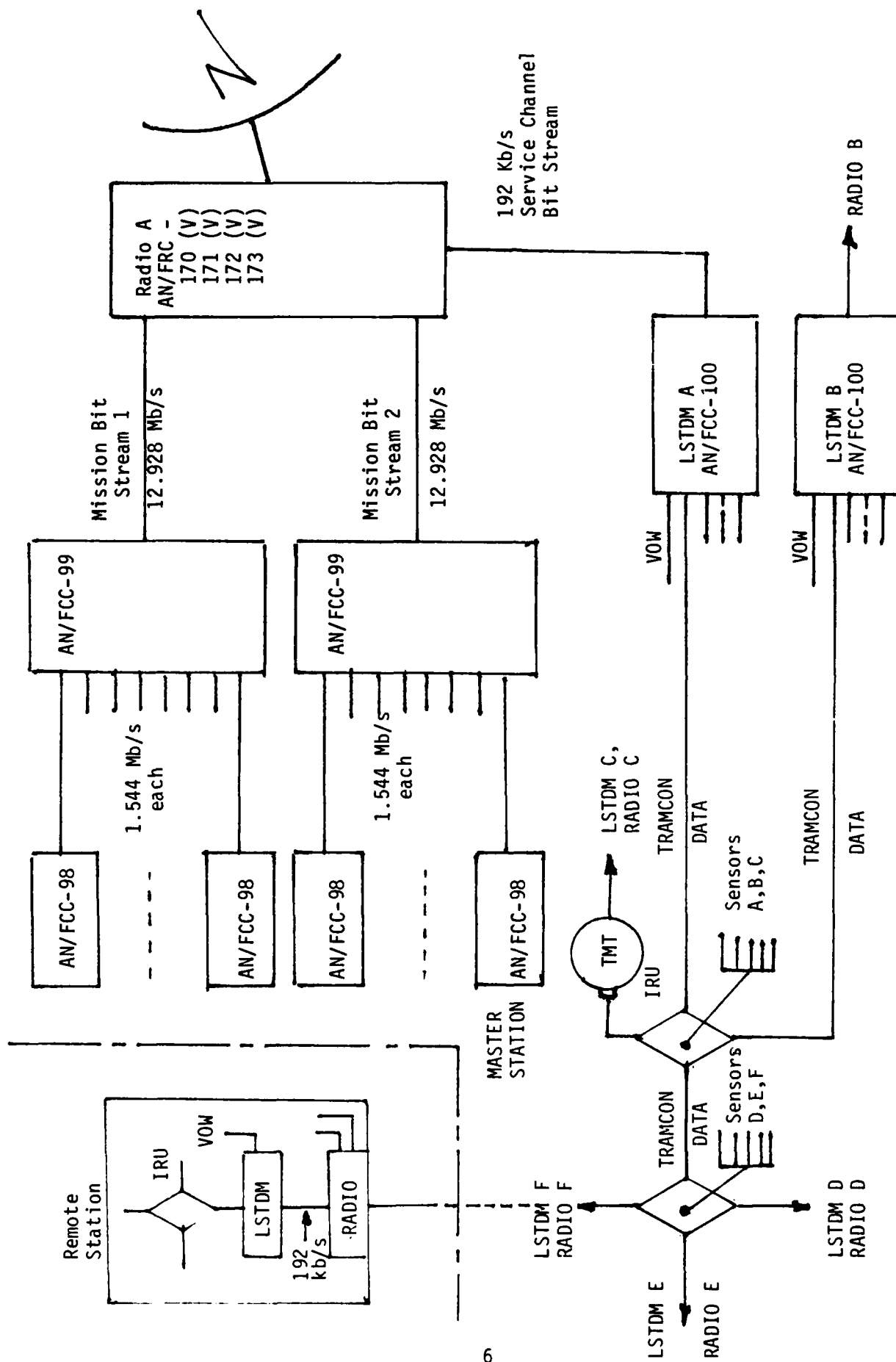


Figure 2. TRAMCON - System Diagram

#### IV. SEGMENTATION DRAWING SYMBOLOGY

Figure 3 illustrates the symbols used in the segmentation drawing. Each master, e.g., M34, serves as the primary for its own segment (S34) and as the alternate (A34) for an adjoining segment. The interfaces are as described in section III. The DACE digital bridges are represented by diamonds and are shown connected to other digital bridges, to the master and to the link (via an LSTDm). All connections and links represent the TRAMCON service channel bit stream. The basic communication functions (data and voice) of the links are assumed, but not shown for simplicity. The presence of a digital bridge implies the presence of an IRU. Each IRU can monitor up to four link terminations and the station equipment. There are four link terminations for location (1), hence one IRU. For location (2), two IRUs are required. To prevent M34 from polling into segment 33, a stopgate is shown to disconnect the related digital bridge port.

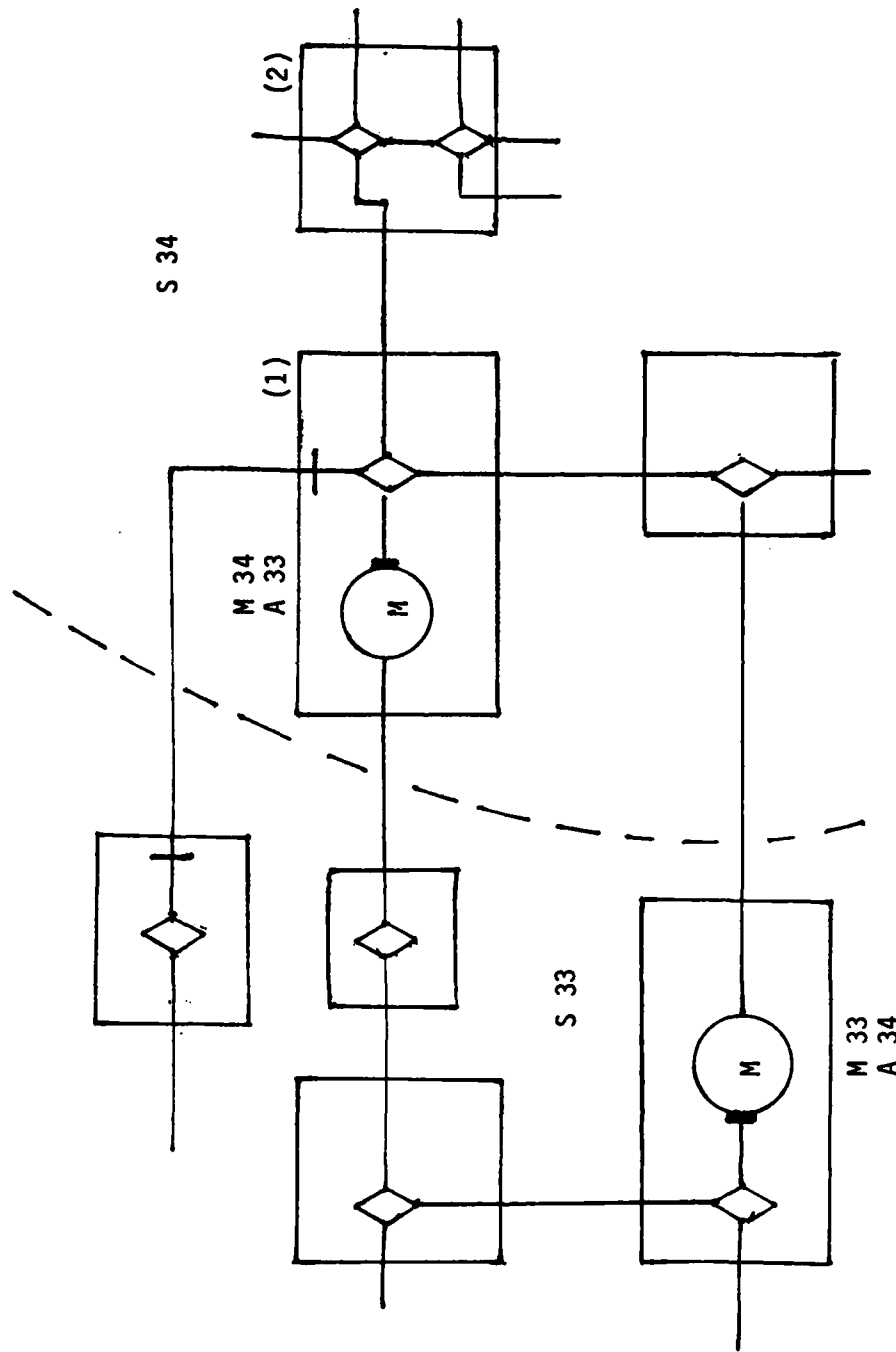


Figure 3. TRAMCON Segmentation



## V. SEGMENTATION DESCRIPTION AND RATIONALE

The segmentation design shown in Figure 1 takes account of the network link-geographical distribution, FCO locations, backup mastership availability, the goal of 21 maximum link terminations per segment, and the need to maintain station monitoring and reporting in spite of possible link outages. In the following discussion, salient segmentation features and problems are presented in preference to a segment by segment analysis.

### 1. SEGMENTATION STRUCTURE

An optimal TRAMCON segmentation structure will compensate for transmission link and TMT/FCO failures to the maximum extent possible. The following examples from Figure 1 illustrate this design aspect:

a. Segments 30 and 31 - M31 at Berlin monitors the eight sites in segment 31. If M31 or the entire site should fail, A29 (alternate side of M29) would provide the backup for M31 through the link to Schwarzenborn. Similarly, M30 at Bremerhaven monitors all ten sites in segment 30. If M30 were disabled, A31, as indicated, would provide the necessary backup through the link to Linderhof to monitor segment 30. Thus, the possibility of primary master failure is provided for by backup mastership. On the other hand, a transmission link failure, e.g., between Bocksberg and Koterberg, would isolate M31 from Koterberg, Rothwesten and Schwarzenborn. However, A29 could take over control of the latter three locations so that the segment, although fragmented, can still be monitored at all locations. This holds for a failure at any link from Berlin to Feldberg. Similarly, if a failure occurred in any link from Basdahl to Linderhof, all sites in segment 30 could still be monitored by M30 and A31.

b. Segments 29 and 16 - M29 at Feldberg monitors the seven sites in segment 29. A16 (the alternate side of M16) could provide the backup for M29 through the link from Brueggen. Similarly, A15 provides backup for M16 through the link from Kalkar to Herongen. In addition, any failure of one of the six links from Brueggen to Feldberg would not isolate the intervening sites of Roetgen, Norvenich, Drabenderhohe, Stein and Giessen since M29 and A16 together could monitor the fragmented segment. Because of the nature of the connectivity and defined TMT locations, not all sites are accessible to the TMT when link failures occur, e.g., Euskirchen in segment 29; Moenchen Gladbach and Rheinberg in segment 16.

### 2. SEGMENT TAILS

Extreme examples of potential node isolation are created by "tails," which are dead-end strings of nodes, e.g., Mormond Hill to Edzell in segment 1. If any one of these links fails, one to four nodes are isolated. Murkle is in a similar situation. Consequently, the tails of segment 1 create a tenuous condition. The connectivity results in several other extensive tails: segment 10, Italy; segment 12, Greece; segment 14, Turkey; and segment 26, Germany.

### 3. SITE SPLITTING.

Three examples of splitting a site into two TRAMCON entities occur: Donnersberg, Hillingdon and Mt. Vergine. The two sectors of Donnersberg and Hillingdon each have a TRAMCON master and are completely independent of each other from a TRAMCON standpoint. The only reason for splitting a site between two segments is to accomplish optimum segmentation.

### 4. SECOND CHANNELS

The AN/FCC-100 LSTDM contemplated for use on the digital links with the DRAMA radio can accommodate the 192 kb/s service channel bit stream on up to 16 separate duplex channels. One channel carries the 64 kb/s voice orderwire (VOW). The remaining 128 kb/s is reserved for TRAMCON and other uses. IRU digital bridge ports at link terminations and alternate TMT ports interface with LSTDM cards in conducting the TRAMCON component of the 192 kb/s service channel bit stream over the digital radio or fiber optic transceiver. A second LSTDM card is required in some cases for the alternate TRAMCON master to gain access to a remote IRU digital bridge through the service channel bit stream. The design avoids the use of second channels wherever possible to allow a more effective direct connection.

### 5. CLOSED LOOPS

By virtue of the DCS connectivity, segments 11, 18, 19, 24 and 28 contain closed link-node loops which would result in undesired circulating TMT and IRU data signals if the loops were allowed to remain closed. The closed loop in segment 11 is composed of Naples, Camoldoli, Lago Di Patria and Epomeo. However, stopgates at Lago Di Patria and Epomeo open the loop. As a result, TMT polling is prevented from circulating back on itself, but, instead, the polling from Naples splits through the digital bridge into two paths: Naples to Epomeo; and Naples to Camoldoli (Agnano and Capodichino) to Lago Di Patria. IRU response paths are the same in a reverse direction. If, during normal operation, a link from Naples to Camoldoli or a link from Camoldoli to Lago Di Patria should become inoperative, the TMT would request the stopgates at Epomeo and Lago Di Patria, in turn, to open, thus accessing these nodes from the Naples - Epomeo direction (stopgates are active on the transmit direction of the digital bridge duplex ports). A similar analysis applies to segment 18 and 24 for the Chievres, Flobecq, Lechenoi, SHAPE loop and the Vaihingen, Friolzheim, Stuttgart, Hohenstadt loops, respectively. For segments 19 and 28 the circulatory loop problem is countered by using the second port of the primary TMT. The reason for doing this is that, by this configuration, one less IRU digital bridge is used at the TMT location. For segment 28, the loop nodes are Frankfurt, Breitsol, Melibocus and Hanau. TMT M28 is able to poll the segment loop either into Breitsol or Hanau. The other TMT port is inactive and effectively opens the loop. Again, if any one of the links become disabled, the TMT is able to poll in the direction(s) required to cover all nodes of the loop. The same TMT configuration is used to monitor the Hahn, Wuescheim, Ellerspring loop of segment 19.

## 6. ALTERNATE TMT ROUTING

An important criterion for proper segmentation design is that the alternate TMT does not traverse a third segment from its own segment location to the segment it is backing up. The reason for this is twofold: (1), alternate traversal of a third segment would create undesirable polling by two masters in one segment; (2), the ability of the alternate to back up a segment would depend on the condition of another segment.

## 7. ALTERNATE TMT BACKUP

Another criterion for proper segmentation design is that the alternate TMT back up only one segment. This has been accomplished except in one case: Coltano, which now backs up segments 8 and 23. The requirement by reference [8] that Vaihingen alternate for Coltano instead of Aviano because of traffic flow considerations leaves it impossible for Aviano to alternate for any segment without traversing another segment. A preferred overall segmentation design limiting alternate backup to one segment would have Vaihingen as backup for Aviano and Aviano as backup for Coltano.

## VI. TRAMCON DATABASE

Information from the Segmentation Drawing No. 201032, Rev. A, is compiled in data base TRAMCON.EURSEGRE, dated 27 Feb 1985. Sorting programs were developed to give segmentation printouts by (1) segment (Table I), (2) country (Table II), and (3) Mildep (Tables III, IV, V). Information included is site name, segment number, primary and backup TMT number, IRU, TMT, RDT, link termination and 2nd channel quantities, MILDEP, FCO and Intermediate Control Office (ICO) identification and summations. A summary of the primary and backup master locations is shown in Table VI.

An "X" in the FCO or ICO column of Table VI indicates that the corresponding primary master location is either a Facility Control Office or an Intermediate Control Office. The FCO and ICO locations are in accordance with the DCA-Europe FCO realignment of reference [9]. Six other primary master locations - Brueggen, Chievres, Hahn, Kalkar, Nuernberg and Thurso - are not covered by reference [9]. The rationale for selecting these six locations for TMT installation is as follows:

### (a) Chievres

In reference [10], the 5th Signal Command, Worms, GE recommended the TMT be installed at Chievres TCF for DEB III (and a RDT at SHAPE TCF), cited the adequacy of personnel, space and power, and remarked that since Chievres is manned only by U.S. personnel, DCS links would remain under U.S. control. USACC, USACSA and DCEC concurred with the recommendation. Further, DCEC noted in their evaluation (reference [11]) that the location of a RDT at SHAPE Command Center (SCC) enhances survivability of the total DEB system since access to TRAMCON information is essential in a reconstitution situation.

### (b) Thurso

NAVTELCOM recommended in their March 1982 comments on TRAMCON that NAVCOMMSTA Thurso be designated as a TMT location since it has maintenance responsibility for Murkle, Latheron, Edzell, Kinnaber, Inverbervie and Aberdeen.

### (c) Kalkar

This site has been recommended for the TMT location by the 5th Signal Command in their evaluation of an early TRAMCON segmentation design. It is to be noted that the Air Force operates and maintains all of the sites in the Kalkar segment.

### (d) Brueggen, Hahn and Nuernberg

Good segmentation design practice required the designation of these three additional sites as master locations. Their selection, coordinated with DCEC and DCA-Europe, gives consistent Mildep responsibility within the segments.

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 PROJECT ENGINEER: W. J. BOMIA  
 DEFENSE COMMUNICATIONS ENGINEERING CENTER: TRANSMISSION ENGINEERING DIRECTORATE;  
 TRANSMISSION NETWORK ENGINEERING DIVISION: 1860 WIEHLE AVE.; RESTON, VA. 22090-5500

## TRANCON SEGMENTS IN EUROPE

LATEST REV.: 02/27/85  
 PRINTED: 03/07/85

PHONE: AV 364-2164 LOCAL (703) 437-2164

LEGEND: \* - STATION HAS MASTER TERM.  
 SEG - TRANCON SEGMENT NOS.  
 # IRU - NO. OF INTELLIGENT REMOTE UNITS  
 # RDT - NO. OF REMOTE DISPLAY TERM.  
 FCO - FACILITY CONTROL OFFICE  
 MNT - MOBILE MAINTENANCE TEAM  
 2NDCH - NO. OF LSTDH CHANNEL CARDS REQUIRED FOR ALTERNATE TMT ACCESS

R - STATION IS REPEATER SITE  
 CODE - 3-LETTER STATION ABBREV.  
 # TMT - NO. OF TRANCON MASTER TERM.  
 FCO - FACILITY CONTROL OFFICE  
 MNT - MOBILE MAINTENANCE TEAM  
 2NDCH - NO. OF LSTDH CHANNEL CARDS REQUIRED FOR ALTERNATE TMT ACCESS

RNKS: NO. OF LOCATIONS = 223

STATION NAME	WILDEP	SEG	CODE	TMT NUMBER		# IRU	# TMT	# RDT	FCO	ICO	MNT	TERM	2NDCH
				PRIMARY	BACK-UP								
001 ABERDEEN UK R	M	1	ABE	M1	A2	1						2	
002 EDZELL UK	M	1	EDZ	M1	A2	1						1	
003 FYLNGDLS UK	AF	1	FYL	M1	A2	1						2	
004 INVERBRV UK R	M	1	INV	M1	A2	1					1	2	
005 KINNABER UK R	M	1	KBR	M1	A2	1						2	
006 LATHERON UK R	M	1	LAT	M1	A2	1						2	
007 MRMDHLL UK	AF	1	MOH	M1	A2	1						4	
008 MURKLE UK	M	1	MKE	M1	A2	1						1	
009 THURSO UK	M	1	TUS	M1	A2	1		2				2	
*** SEGMENT TOTALS ***													
010 BENTWTRS UK	AF	2	BNT	M2	A1	9	1	2	0	0	2	10	7
011 COLCHSTR UK	AF	2	CHR	M2	A1	1						3	
012 GTBROHLY UK R	AF	2	GTB	M2	A1	1						2	
013 MTLSHHNT UK	AF	2	HAM	M2	A1	1	1	2	1	1	1	4	2
014 SHBRYNSS UK R	AF	2	SHS	M2	A1	1						2	
015 WOODBRDG UK	AF	2	WBG	M2	A1	1						1	
016 WTHRSFLD UK	AF	2	WTH	M2	A1	1						2	
*** SEGMENT TOTALS ***													
017 ALCONBRY UK	AF	3	ANY	M3	A5	7	1	2	0	1	1	17	3
018 BFDSTJHM UK	AF	3	BFD	M3	A5	1						2	
019 BRIZNRTM UK	AF	3	B2N	M3	A5	1						1	
020 CHELVSTM UK R	AF	3	CHV	M3	A5	1						2	
021 CROUGHTM UK	AF	3	CRO	M3	A5	1	1	2	1	1		4	
022 DAVENTRY UK R	AF	3	DAV	M3	A5	1						2	
023 FAIRFORD UK	AF	3	FRD	M3	A5	1						2	
024 HOLSWRTH UK	AF	3	HOL	M3	A5	1						2	
025 UPHEYFRD UK	AF	3	UHD	M3	A5	1						2	
*** SEGMENT TOTALS ***													
026 BARKWAY UK	AF	4	BRY	M4	A6	9	1	2	0	1	0	19	1
027 BOVINGDM UK R	AF	4	BOV	M4	A6	1						4	2
028 CHCKSNDK UK	AF	4	CKS	M4	A6	1						2	
029 HOMINGTM UK	AF	4	HOM	M4	A6	1						2	
030 LAKENHTH UK	AF	4	LAH	M4	A6	1						2	
031 MENDLSHM UK R	AF	4	NDM	M4	A6	1						2	

TABLE I. (cont'd)  
TRAMCON SEGMENTS IN EUROPE

032	MILDNILL	UK	AF	4	MIL	M4	A6	1	1	2	1	2	1
*** SEGMENT TOTALS ***													
033	ABINGDON	UK	AF	5	ABM	M5	A3	1	1	2	2	2	2
034	BENSON	UK	AF	5	BSM	M5	A3	1	1	2	2	2	2
035	CRMSCHN	UK	AF	5	CRS	M5	A3	1	1	4	4	2	2
036	FARNBRO	UK	AF	5	FBM	M5	A3	1	1	2	2	2	2
037	GRNHCHN	UK	AF	5	GHC	M5	A3	1	1	2	2	2	2
038	HILLINGDN	UK	AF	5	HIN	M5	A3	1	1	1	1	1	1
039	HIWYCOMB	UK	AF	5	HYE	M5	A3	1	1	2	2	2	2
*** SEGMENT TOTALS ***													
040	BOTLYHLL	UK	AF	6	BFM	M6	A4	7	1	2	1	15	9
041	CHATHAN	UK	AF	6	CHM	M6	A4	1	1	4	4	3	3
042	COLDLOW	UK	AF	6	CDW	M6	A4	1	1	3	3	2	2
043	DUNKIRK	UK	AF	6	DNK	M6	A4	1	1	2	2	2	2
044	HILLINGDN	UK	AF	6	HIN	M6	A4	1	1	2	2	2	2
045	LONDON	UK	M	6	LDN	M6	A4	1	1	2	2	2	2
046	SWINGATE	UK	R	6	SWG	M6	A4	1	1	2	2	2	2
*** SEGMENT TOTALS ***													
047	HUOUSA	SP	AF	7	HUM	M7	A10	7	1	2	1	18	1
048	INOSES	SP	AF	7	INO	M7	A10	1	1	2	2	2	2
049	MINORCA	SP	AF	7	MNA	M7	A10	1	1	2	2	2	2
050	SOLLER	SP	AF	7	SOL	M7	A10	1	1	2	2	2	2
051	TORREJON	SP	AF	7	TJN	M7	A10	1	1	2	2	2	2
052	ZARAGOZA	SP	R	7	ZAR	M7	A10	1	1	2	2	2	2
*** SEGMENT TOTALS ***													
053	AVIANO	IT	AF	8	AVO	M8	A9	6	1	2	1	11	10
054	CEGGIA	IT	A	8	CEG	M8	A9	1	1	2	1	1	1
055	MT VENDA	IT	AF	8	MTE	M8	A9	1	1	2	1	3	1
056	VICENZA	IT	A	8	VCA	M8	A9	1	1	2	1	1	1
*** SEGMENT TOTALS ***													
057	CINAGLIN	IT	AF	9	CIM	M9	A24	4	1	2	1	7	1
058	COLTANO	IT	A	9	CLO	M9	A24	1	1	2	1	2	1
059	MT CORRA	IT	AF	9	MCA	M9	A24	1	1	2	1	3	2
060	MT SERRA	IT	AF	9	MTS	M9	A24	1	1	2	1	3	2
061	MT CIMONE	IT	AF	9	MTC	M9	A24	1	1	2	1	2	2
062	PAGANELLO	IT	AF	9	PAG	M9	A24	1	1	2	1	2	2
063	SAVONA	IT	R	9	SAV	M9	A24	1	1	2	1	2	2
*** SEGMENT TOTALS ***													
064	CALTAGRN	IT	AF	10	CAL	M10	A7	7	1	2	1	16	11
065	CONISO	IT	AF	10	CON	M10	A7	1	1	2	1	2	2
066	MT LIMBAR	IT	AF	10	MBA	M10	A7	1	1	2	1	3	3
067	MT VERGIN	IT	AF	10	MRE	M10	A7	1	1	2	1	3	1
068	REGGIO	IT	AF	10	REG	M10	A7	1	1	2	1	2	2
069	SIGONELL	IT	M	10	SGA	M10	A7	1	1	2	1	2	2
*** SEGMENT TOTALS ***													
070	AGMANO	IT	M	11	AGA	M11	A12	6	1	2	1	13	4
*** SEGMENT TOTALS ***													
070	AGMANO	IT	M	11	AGA	M11	A12	1	1	2	1	1	1

TRAMCON SEGMENTS IN EUROPE

[illegible]

TABLE I. (cont'd)

119	VUGHT	NL	AF	15	VUG	M15	--A30--	1	--	--	--	2
120	WNSDRCHT	NL	AF	15	WDT	M15	--A30--	1	--	--	--	2
... SEGMENT TOTALS ...												
121	BRUEGGEN GE *	A	A	16	BUN	M16	--A15--	1	--	--	--	4
122	BRUNSSUM NL	A	A	16	BRU	M16	--A15--	1	--	--	--	2
123	HERONGEN GE	A	A	16	HER	M16	--A15--	1	--	--	--	3
124	NNCHGDBC GE	A	A	16	XGB	M16	--A15--	1	--	--	--	1
125	RHEINBRG GE	A	A	16	XBG	M16	--A15--	1	--	--	--	1
126	SCHINNEN NL	A	A	16	SHI	M16	--A15--	1	--	--	--	2
... SEGMENT TOTALS ...												
127	BITBURG GE	AF		17	BIG	M17	--A18--	1	--	--	--	2
128	MUHL GE	AF		17	MUL	M17	--A18--	2	--	--	--	6
129	SCHONFLD GE *	AF		17	SCH	M17	--A18--	1	--	--	--	3
130	SPMLCKPS BE R	AF		17	SPA	M17	--A18--	1	--	--	--	2
131	SPNGDHLM GE	AF		17	SPH	M17	--A18--	1	--	--	--	2
... SEGMENT TOTALS ...												
132	BEN ANIN BE R	AF		18	BNA	M18	--A17--	1	--	--	--	2
133	CHIEVRES BE *	A		18	CHE	M18	--A17--	3	--	--	--	2
134	FLORECO BE	AF		18	FLO	M18	--A17--	1	--	--	--	3
135	FLORENNS BE	AF		18	FLR	M18	--A17--	1	--	--	--	1
136	HOUTEN BE R	AF		18	HOU	M18	--A17--	1	--	--	--	2
137	LECHEMOI BE	AF		18	LEC	M18	--A17--	1	--	--	--	4
138	SHAPE	AF		18	SPB	M18	--A17--	1	--	--	--	2
139	SHAPERRS BE R	AF		18	SHR	M18	--A17--	1	--	--	--	2
140	WESTRZBK BE R	AF		18	WEZ	M18	--A17--	1	--	--	--	2
... SEGMENT TOTALS ...												
141	ADENAU GE	AF		19	ANU	M19	--A20--	1	--	--	--	4
142	DANNFLS GE	A		19	DNF	M19	--A20--	1	--	--	--	2
143	ELRSPRMG GE	AF		19	EPG	M19	--A20--	2	--	--	--	6
144	HAHN GE *	AF		19	HAN	M19	--A20--	2	--	--	--	4
145	WUESCHEM GE	A		19	WSH	M19	--A20--	1	--	--	--	2
... SEGMENT TOTALS ...												
146	BANN GE	AF		20	BAN	M20	--A23--	2	--	--	--	6
147	RAMSTEIN GE*	AF		20	RSN	M20	--A23--	1	--	--	--	3
148	SENBACH GE	AF		20	SEH	M20	--A23--	1	--	--	--	3
... SEGMENT TOTALS ...												
149	BAUMHLDR GE	A		21	BHR	M21	--A19--	1	--	--	--	2
150	BDKRZNCH GE	A		21	BKH	M21	--A19--	1	--	--	--	2
151	DNFRSBRG GE *	A		21	DON	M21	--A19--	1	--	--	--	4
152	LINDSEY GE	AF		21	LSY	M21	--A19--	1	--	--	--	2
153	MAINZ GE	A		21	MNZ	M21	--A19--	1	--	--	--	2
154	WIESBADN GE	A		21	WBW	M21	--A19--	1	--	--	--	3
... SEGMENT TOTALS ...												
155	DNFRSBRG GE *	A		22	DON	M22	--A27--	2	--	--	--	6
156	KSRSLTRM GE	A		22	KLW	M22	--A27--	1	--	--	--	2
157	LANDSTHL GE	A		22	LDI	M22	--A27--	1	--	--	--	3



## TRAMCON SEGMENTS IN EUROPE

158	LOHNSFLD GE	1	A	22	LFD	M22	A27	1	1	2	0	1	0	13	0
... SEGMENT TOTALS ...															
159	LANGKPF GE	1	AF	23	LKF	M23	A9	2	1	2	1	1	1	6	1
160	PIRMASNS GE	1	A	23	PMS	M23	A9	1	1	2	1	1	1	3	1
161	SCHURZWD GE	1	A	23	S2D	M23	A9	1	1	2	1	1	1	2	1
162	ZWBRCAF GE	1	AF	23	ZWE	M23	A9	1	1	2	1	1	1	2	1
163	ZWBRCKN GE	1	A	23	ZBN	M23	A9	1	1	2	1	1	1	2	1
... SEGMENT TOTALS ...															
164	FRIOLZNR GE	1	A	24	FRI	M24	A25	6	1	2	1	1	0	15	1
165	HEILBRNN GE	1	A	24	HBL	M24	A25	1	1	2	1	1	1	4	1
166	HOHNSTDT GE	1	A	24	HST	M24	A25	2	1	2	1	1	1	2	3
167	STCKSBRG GE	1	A	24	SSB	M24	A25	1	1	2	1	1	1	2	1
168	STUTTGRT GE	1	A	24	SGT	M24	A25	1	1	2	1	1	1	4	1
169	VAININGN GE	1	A	24	VHN	M24	A25	1	1	2	1	1	1	3	1
170	ZUGSPITZ GE	1	AF	24	ZUG	M24	A25	1	1	2	1	1	1	2	2
... SEGMENT TOTALS ...															
171	BONSTTTM GE	1	A	25	BST	M25	A26	8	1	2	1	0	1	21	6
172	GABLINGN GE	1	A	25	GAB	M25	A26	1	1	2	1	1	1	3	2
173	HEIDENHM GE	1	AF	25	HDM	M25	A26	1	1	2	1	1	1	1	1
174	HNPSNBRG GE	1	A	25	HPC	M25	A26	1	1	2	1	1	1	2	1
175	KATTRBCH GE	1	A	25	KAT	M25	A26	1	1	2	1	1	1	2	1
176	MUNICH GE	1	A	25	MNH	M25	A26	1	1	2	1	1	1	1	1
177	RSACSBRG GE	1	A	25	RAG	M25	A26	1	1	2	1	1	1	3	1
... SEGMENT TOTALS ...															
178	BRANDHOF GE	1	AF	26	BDH	M26	A28	7	1	2	1	0	1	14	3
179	GEIGNUNG GE	1	A	26	GEG	M26	A28	1	1	2	1	1	1	2	1
180	GRAFENWHR GE	1	A	26	GRA	M26	A28	1	1	2	1	1	1	3	1
181	HOHENFLS GE	1	A	26	HFL	M26	A28	1	1	2	1	1	1	1	1
182	MUERBRG GE	1	A	26	NBG	M26	A28	1	1	2	1	1	1	3	1
183	RNRWZHEN GE	1	A	26	RWH	M26	A28	1	1	2	1	1	1	2	1
184	SCHNEBRG GE	1	A	26	SNB	M26	A28	1	1	2	1	1	1	1	1
185	SCHUNBRG GE	1	AF	26	SHW	M26	A28	1	1	2	1	1	1	2	1
... SEGMENT TOTALS ...															
186	HEIDLBRG GE	1	A	27	HDG	M27	A22	8	1	2	0	0	1	16	1
187	KARLSRUH GE	1	A	27	KRE	M27	A22	1	1	2	1	1	1	2	1
188	KONSTHHL GE	1	A	27	KSL	M27	A22	3	1	2	1	1	1	6	1
189	MANNHEIM GE	1	A	27	MHN	M27	A22	1	1	2	1	1	1	2	1
190	SCHUTZGN GE	1	A	27	SCW	M27	A22	1	1	2	1	1	1	2	1
191	WORMS GE	1	A	27	WMS	M27	A22	1	1	2	1	1	1	2	1
... SEGMENT TOTALS ...															
192	BREITSOL GE	1	A	28	BTL	M28	A21	8	1	2	1	0	1	17	0
193	DARNSTDT GE	1	A	28	DST	M28	A21	1	1	2	1	1	1	4	2
194	FRANKFRT GE	1	A	28	FKT	M28	A21	2	1	2	1	1	1	1	1
195	HANAU GE	1	A	28	HNA	M28	A21	1	1	2	1	1	1	2	1
196	MELTBOSCS GE	1	A	28	MEL	M28	A21	1	1	2	1	1	1	4	1
197	RHEINMAN GE	1	AF	28	RHM	M28	A21	1	1	2	1	1	1	4	1
198	WURZBURG GE	1	A	28	WBG	M28	A21	1	1	2	1	1	1	2	2

TABLE I. (cont'd)  
TRANCON SEGMENTS IN EUROPE

... SEGMENT TOTALS ...															
199	DRBDRHH	GE R	A	29	DBH	M29	A16	1	1	2	1	0	21	5	
200	EUSKRCHN	GE	A	29	EUS	M29	A16	1	1	1	1	1	2	1	
201	FELDBERG	GE	AF	29	FEL	M29	A16	3	1	2	1	1	7	1	
202	GIESSEN	GE	A	29	GSN	M29	A16	1	1	1	1	1	2	1	
203	NORVENCH	GE	A	29	NOV	M29	A16	1	1	1	1	1	3	1	
204	ROETGEN	GE	AF	29	RGN	M29	A16	1	1	1	1	1	4	1	
205	STEIN	GE	A	29	STN	M29	A16	1	1	1	1	1	2	1	
... SEGMENT TOTALS ...															
206	BARNE	GE R	A	30	BME	M30	A31	9	1	2	0	1	21	0	
207	BASDAHL	GE	AF	30	BAS	M30	A31	1	1	1	1	1	2	1	
208	BDUENDR	GE	AF	30	BAM	M30	A31	1	1	1	1	1	3	1	
209	BREMRHVN	GE	A	30	BRN	M30	A31	1	1	2	1	1	1	1	
210	DOTLINGN	GE R	AF	30	DOT	M30	A31	1	1	1	1	1	2	1	
211	DUENSEN	GE R	A	30	DSN	M30	A31	1	1	1	1	1	2	1	
212	GARLSTDT	GE	A	30	GAR	M30	A31	1	1	1	1	1	3	1	
213	HSCODNDF	GE	AF	30	HES	M30	A31	1	1	1	1	1	1	1	
214	LANGNDNH	GE R	A	30	LAN	M30	A31	1	1	1	1	1	2	1	
215	LINDERHF	GE	A	30	LDF	M30	A31	1	1	1	1	1	2	1	
... SEGMENT TOTALS ...															
216	BERLIN BZ	A	A	31	BLN	M31	A29	10	1	2	1	0	20	8	
217	BOCKSBRG	GE	A	31	BBG	M31	A29	1	1	2	1	1	2	1	
218	DRCKNBGR	GE R	A	31	DKB	M31	A29	1	1	1	1	1	3	1	
219	HELMSTDT	GE	A	31	HMT	M31	A29	1	1	1	1	1	1	1	
220	KOTERBRG	GE	AF	31	KBC	M31	A29	1	1	1	1	1	3	1	
221	ROTHWSTN	GE R	AF	31	RWN	M31	A29	1	1	1	1	1	2	1	
222	SCHWZNSBN	GE R	AF	31	SBN	M31	A29	1	1	1	1	1	2	1	
223	TENPELHF BZ	GE	AF	31	TPF	M31	A29	1	1	1	1	1	1	1	
... SEGMENT TOTALS ...															
								6	1	2	1	0	16	5	
... SUM OF SEGMENT TOTALS ...															
								243	31	63	19	16	17	523	118

TABLE II.

DSNAME: R7065, TRANCON, EURSEGRE COUNTRY SORT OF TRANCON SEGMENTS IN EUROPE LATEST REV.: 02/27/85  
 PROJECT ENGINEER: W. J. BONIA CODE: R210 PHONE: AV 364-2164 LOCAL (703) 437-2164 PRINTED: 03/07/85  
 DEFENSE COMMUNICATIONS ENGINEERING CENTER; TRANSMISSION ENGINEERING DIRECTORATE;  
 TRANSMISSION NETWORK ENGINEERING DIVISION; 1860 WIEHLE AVE.; RESTON, VA. 22090-5500

STATION NAME	MILDEP	SEG	CODE	TMT NUMBER		# IRU	# TMT	# RDT	FCO	ICO	MNT	TERM	2NDCH
				PRIMARY	BACK-UP								
001 CHIEVRES BE	A	18	CHE	M18	A17	3	1	2				2	1
002 BEN AHIN BE	AF	18	BNA	M18	A17	1						2	3
003 FLORECO BE	AF	18	FLO	M18	A17	1					1	3	2
004 FLOREMS BE	AF	18	FLR	M18	A17	1						1	
005 HOUTEM BE	AF	18	HOU	M18	A17	1						2	
006 LECHMOI BE	AF	18	LEC	M18	A17	1						4	2
007 SHAPE BE	AF	18	SPB	M18	A17	1		1				2	
008 SHAPERS BE	AF	18	SPR	M18	A17	1						2	
009 SPMLCPS BE	AF	17	SPA	M17	A18	1						2	3
010 WESTRZBK BE	AF	18	WEZ	M18	A17	1						2	
*** COUNTRY TOTALS ***													
011 BERLIN BZ	A	31	BLN	M31	A29	12	1	3	0	0	1	22	11
012 TENPELHF BZ	AF	31	TPF	M31	A29	1	1	2	1			2	1
*** COUNTRY TOTALS ***													
013 BARNE GE	A	30	BME	M30	A31	1						2	
014 BAUHLOR GE	A	21	BHR	M21	A19	1						2	
015 BDRZMCH GE	A	21	BKH	M21	A19	1						2	1
016 BOCKSBRG GE	A	31	BBC	M31	A29	1						3	2
017 BONSTTTN GE	A	25	BST	M25	A26	1						3	2
018 BREITSOL GE	A	28	BTL	M28	A21	1						4	2
019 BREHRVN GE	A	30	BRN	M30	A31	1	1	2	1			1	1
020 BRUEGGEN GE	A	16	BUN	M16	A15	1	1	2	1		1	4	
021 DANNFLS GE	A	19	DNF	M19	A20	1						4	
022 DARSSTDT GE	A	28	DST	M28	A21	1						1	
023 DNRSBRG GE	A	21	DON	M21	A19	1	1	2	1	1		4	
024 DNRSBRG GE	A	22	DON	M22	A27	2	1	2				6	
025 DRBRDRHH GE	A	29	DBH	M29	A16	1						2	
026 DRCKNBGR GE	A	31	DKB	M31	A29	1						2	
027 DUNSEN GE	A	30	DSN	M30	A31	1						2	
028 EUSKRCNM GE	A	29	EUS	M29	A16	1						1	
029 FRANKFT GE	A	28	FKT	M28	A21	2	1	2	1			4	1
030 FRITOLZHM GE	A	24	FRI	M24	A25	1						4	
031 GABLINGN GE	A	25	GAB	M25	A26	1						1	
032 GARLSTDT GE	A	30	GAR	M30	A31	1						3	2
033 GEIGNWNG GE	A	26	GEG	M26	A28	1						3	
034 GIESSEN GE	A	29	GSN	M29	A16	1						2	

RMKS: NO. OF LOCATIONS = 223

TABLE II. (cont'd)

035	GRAFWHR	GE	A	26	GRA	M26	A28	1	1	2	2
036	HANAU	GE	A	28	HNA	M28	A21	1	1	2	2
037	HEIDLBRG	GE	A	27	HDG	M27	A22	1	1	2	2
038	HEILBRNN	GE	A	24	HBL	M24	A25	1	1	2	2
039	HELMSTDT	GE	A	31	HMT	M31	A29	1	1	2	2
040	HERONGEN	GE	A	16	HER	M16	A15	1	1	3	3
041	HNPSNBURG	GE	A	25	HPG	M25	A26	1	1	2	2
042	HOHENFLS	GE	A	26	HFL	M26	A28	1	1	4	4
043	HOHNSTDT	GE	A	24	HST	M24	A25	2	2	1	1
044	KARLSRUH	GE	A	27	KRE	M27	A22	1	1	2	2
045	KATTRBCH	GE	A	25	KAT	M25	A26	1	1	2	2
046	KONGSTHL	GE	A	27	KSL	M27	A22	3	3	1	1
047	KRSRLTRN	GE	A	22	KLN	M22	A27	1	1	2	2
048	LANDSTHL	GE	A	22	LDL	M22	A27	1	1	2	2
049	LANGMDMM	GE	A	30	LAN	M30	A31	1	1	2	2
050	LINDERHF	GE	A	30	LDF	M30	A31	1	1	2	2
051	LOHNSFLD	GE	A	22	LFD	M22	A27	1	1	2	2
052	MAINZ	GE	A	21	MNZ	M21	A19	1	1	2	2
053	MANNHEIM	GE	A	27	MHN	M27	A22	1	1	2	2
054	MELTBOCS	GE	A	28	MEL	M28	A21	1	1	4	4
055	MNCHGDBC	GE	A	16	MGB	M16	A15	1	1	1	1
056	MUNICH	GE	A	25	MNH	M25	A26	1	1	1	1
057	NORVENCH	GE	A	29	NOV	M29	A16	1	1	3	3
058	NUERNBURG	GE	A	26	NBG	M26	A28	1	1	3	3
059	PIRMASNS	GE	A	23	PMS	M23	A9	1	1	3	3
060	RHEINBRG	GE	A	16	RBG	M16	A15	1	1	1	1
061	RNRZHFN	GE	A	26	RWH	M26	A28	1	1	2	2
062	RSAGSBRG	GE	A	25	RAG	M25	A26	1	1	3	3
063	SCHNEBRG	GE	A	26	SNB	M26	A28	1	1	1	1
064	SCHWRZWD	GE	A	23	SZD	M23	A9	1	1	1	1
065	SCHWTZGN	GE	A	27	SCW	M27	A22	1	1	2	2
066	STCKSBRG	GE	A	24	SSB	M24	A25	1	1	2	2
067	STEIN	GE	A	29	STN	M29	A16	1	1	2	2
068	STUTTGR	GE	A	24	SGT	M24	A25	1	1	4	4
069	VAIHINGN	GE	A	24	VHN	M24	A25	1	1	3	3
070	WIESBADN	GE	A	21	WBN	M21	A19	1	1	3	3
071	WORMS	GE	A	27	WMS	M27	A22	1	1	2	2
072	WUESCHEM	GE	A	19	WSM	M19	A20	1	1	2	2
073	WURZBURG	GE	A	28	WBG	M28	A21	1	1	2	2
074	ZWEBRCKN	GE	A	23	ZBN	M23	A9	1	1	2	2
075	ADENAU	GE	A	19	ANU	M19	A20	1	1	4	4
076	BANN	GE	A	20	BAN	M20	A23	2	2	6	6
077	BASDAHL	GE	A	30	BAS	M30	A31	1	1	2	2
078	BDNUENDR	GE	A	30	BAM	M30	A31	1	1	3	3
079	BITBURG	GE	A	17	BIG	M17	A18	1	1	2	2
080	BRANDHOF	GE	A	26	BDH	M26	A28	1	1	2	2
081	DAHME	GE	A	15	DHE	M15	A30	1	1	2	2
082	DOTLINGN	GE	A	30	DOT	M30	A31	1	1	2	2
083	ELSPRNG	GE	A	19	EPG	M19	A20	2	2	6	6
084	FELBERG	GE	A	29	FEL	M29	A16	3	3	7	7
085	GROSSRKN	GE	A	15	GRN	M15	A30	1	1	4	4
086	HAHN	GE	A	19	HAN	M19	A20	2	2	2	2
087	HAMNKLN	GE	A	15	HAM	M15	A30	1	1	2	2
088	HEIDENHM	GE	A	25	HDH	M25	A26	1	1	2	2
089	HSCODNDF	GE	A	30	HES	M30	A31	1	1	1	1
090	IBBENBRN	GE	A	15	IBN	M15	A30	1	1	2	2
091	KAI KAR	GE	A	15	KAL	M15	A30	1	1	3	3
092	KOTERBRG	GE	A	31	KBG	M31	A29	1	1	3	3
093	LANGRKPF	GE	A	23	LKF	M23	A9	2	2	6	6
094	LINDSEY	GE	A	21	LSY	M21	A19	1	1	2	2

TABLE II. (cont'd)  
COUNTRY SORT OF TRANCON SEGMENTS IN EUROPE

095 MUHL	GE	AF	17	MUL	M17	A18	2	1	2	1	1	1	6	---
096 RANSTEIN	GE	AF	20	RSN	M20	A23	1	1	1	1	1	1	3	---
097 RHEINMAN	GE	AF	28	RHN	M28	A21	1	1	1	1	1	1	4	---
098 ROETGEN	GE	AF	29	RGN	M29	A16	1	1	1	1	1	1	4	---
099 ROTHMSTN	GE	AF	31	RWN	M31	A29	1	1	1	1	1	1	2	---
100 SCHONFLD	GE	AF	17	SCN	M17	A18	1	1	1	1	1	1	3	---
101 SCHOPMGN	GE	AF	15	SCN	M15	A30	1	1	1	1	1	1	2	---
102 SCHUNBRG	GE	AF	26	SHW	M26	A28	1	1	1	1	1	1	2	---
103 SCHWZBNB	GE	AF	31	SBN	M31	A29	1	1	1	1	1	1	2	---
104 SENBACH	GE	AF	20	SEH	M20	A23	1	1	1	1	1	1	3	---
105 SPNGDHLN	GE	AF	17	SPH	M17	A18	1	1	1	1	1	1	2	---
106 ZUGSPITZ	GE	AF	24	ZUG	M24	A25	1	1	1	1	1	1	2	---
107 ZWEBRCAF	GE	AF	23	ZWE	M23	A9	1	1	1	1	1	1	2	---
*** COUNTRY TOTALS ***				107	15	30	8	6	7	251	34	---	---	---
108 HELLENKM	GR	AF	12	HEL	M12	A11	1	1	1	1	1	1	1	---
109 IRAKLION	GR	AF	12	IRK	M12	A11	1	1	1	1	1	1	1	---
110 LEVKAS	GR	AF	12	LEV	M12	A11	1	1	1	1	1	1	3	---
111 MTEDHERI	GR	AF	12	MEI	M12	A11	1	1	1	1	1	1	2	---
112 MTPARNIS	GR	AF	12	MPR	M12	A11	1	1	1	1	1	1	3	---
113 MTPATERS	GR	AF	12	PAT	M12	A11	1	1	1	1	1	1	2	---
114 KATOSOU	GR	N	12	KAO	M12	A11	1	1	1	1	1	1	2	---
115 MEAKRI	GR	N	12	NHK	M12	A11	1	1	1	1	1	1	1	---
*** COUNTRY TOTALS ***				6	1	2	1	1	1	16	8	---	---	---
116 CEGGIA	IT	A	8	CEG	M8	A9	1	1	1	1	1	1	2	---
117 COLTANO	IT	A	9	CLO	M9	A24	1	1	1	1	1	1	3	---
118 SAVONA	IT	A	9	SAV	M9	A24	1	1	1	1	1	1	2	---
119 VICENZA	IT	A	8	VCA	M8	A9	1	1	1	1	1	1	1	---
120 AVIANO	IT	AF	8	AVO	M8	A9	1	1	1	1	1	1	1	---
121 CALTAGRN	IT	AF	10	CAL	M10	A7	1	1	1	1	1	1	2	---
122 CINAGLIN	IT	AF	9	CIN	M9	A24	1	1	1	1	1	1	1	---
123 CONISO	IT	AF	10	COM	M10	A7	1	1	1	1	1	1	2	---
124 MTRNFRNC	IT	AF	11	MRA	M11	A12	1	1	1	1	1	1	3	---
125 MT CORNA	IT	AF	9	MCA	M9	A24	1	1	1	1	1	1	3	---
126 MT SERRA	IT	AF	9	MTS	M9	A24	1	1	1	1	1	1	2	---
127 MT VENDA	IT	AF	8	MTE	M8	A9	1	1	1	1	1	1	3	---
128 MTCINOME	IT	AF	9	MTC	M9	A24	1	1	1	1	1	1	2	---
129 MTLIMBAR	IT	AF	10	MBA	M10	A7	1	1	1	1	1	1	3	---
130 MIVERGIN	IT	AF	10	MRE	M10	A7	1	1	1	1	1	1	3	---
131 MIVERGIN	IT	AF	11	MRE	M11	A12	1	1	1	1	1	1	2	---
132 PAGANELL	IT	AF	9	PAG	M9	A24	1	1	1	1	1	1	2	---
133 REGGIO	IT	AF	10	REG	M10	A7	1	1	1	1	1	1	2	---
134 SNVTDNMN	IT	AF	11	SNV	M11	A12	1	1	1	1	1	1	1	---
135 AGNANO	IT	N	11	AGA	M11	A12	1	1	1	1	1	1	1	---
136 CAHOLDOL	IT	N	11	CAO	M11	A12	1	1	1	1	1	1	5	---
137 CAPODCHN	IT	N	11	CPO	M11	A12	1	1	1	1	1	1	1	---
138 LAGODPTR	IT	N	11	LAG	M11	A12	1	1	1	1	1	1	3	---
139 MTEPOMEQ	IT	N	11	EPO	M11	A12	1	1	1	1	1	1	2	---
140 NAPLES	IT	N	11	NPS	M11	A12	1	1	1	1	1	1	2	---
141 SIGONELL	IT	N	10	SGA	M10	A7	1	1	1	1	1	1	2	---
*** COUNTRY TOTALS ***				27	4	8	5	4	2	96	24	---	---	---
142 BRUNSSUN	NL	A	16	BRU	M16	A15	1	1	1	1	1	1	2	---
143 SCHINNEN	NL	A	16	SHI	M16	A15	1	1	1	1	1	1	2	---
144 ERP	NL	AF	15	ERP	M15	A30	1	1	1	1	1	1	2	---
145 KEIZRSVR	NL	AF	15	KIZ	M15	A30	1	1	1	1	1	1	2	---

TABLE II. (cont'd)

[illegible]

TABLE II. (cont'd)

\*\*\* COUNTRY TOTALS \*\*\*

SUM OF COUNTRY TOTALS \*\*\*

TABLE III.

DSNAME: R7065, TRANCON, EURSECURE  
 PROJECT ENGINEER: W. J. BONIA CODE: R210 PHONE: AV 364-2164 LOCAL (703) 437-2164  
 DEFENSE COMMUNICATIONS ENGINEERING CENTER; TRANSMISSION ENGINEERING DIRECTORATE;  
 TRANSMISSION NETWORK ENGINEERING DIVISION; 1860 WIEHLE AVE.; RESTON, VA. 22090-5500

## ARMY SORT OF TRANCON SEGMENTS IN EUROPE

LATEST REV.: 02/27/85  
 PRINTED: 03/07/85

LEGEND: \* - STATION HAS MASTER TERM.  
 SEG - TRANCON SEGMENT NOS.  
 # IRU - NO. OF INTELLIGENT REMOTE UNITS  
 # RDT - NO. OF REMOTE DISPLAY TERM.  
 ICO - INTERMEDIATE CONTROL OFFICE  
 TERM - NO. OF LINK TERMINATIONS

R  
 CODE - STATION IS REPEATER SITE  
 # TMT - 3-LETTER STATION ABBREV.  
 FCO - NO. OF TRANCON MASTER TERM.  
 MNT - FACILITY CONTROL OFFICE  
 2NDCH - MOBILE MAINTENANCE TEAM  
 - NO. OF LSTON CHANNEL CARDS REQUIRED FOR ALTERNATE TMT ACCESS

RMKS: NO. OF LOCATIONS = 070

STATION NAME	MILDEP	SEG	CODE	TMT NUMBER		# IRU	# TMT	# RDT	FCO	MNT	TERM	2NDCH
				PRIMARY	BACK-UP							
001 BARNE	GE R	A	30	M30	A31	1					2	
002 BAUMHLDR	GE	A	21	M21	A19	1					2	
003 BDKRZCH	GE	A	21	M21	A19	1					2	1
004 BERLIN	BZ	A	31	M31	A29	1	1	2	1		2	1
005 BOCKSBG	GE	A	31	M31	A29	1					3	2
006 BONSTTM	GE	A	25	M25	A26	1					3	2
007 BREITSL	GE	A	28	M28	A21	1					4	2
008 BRENRHM	GE	A	30	M30	A31	1	1	2	1		1	1
009 BRUEGGEN	GE	A	16	M16	A15	1	1	2			4	
010 BRUNSSUN	ML	A	16	M16	A15	1					2	
011 CEGGIA	IT	A	8	M8	A9	1					2	
012 CHIEVRES	BE	A	18	M18	A17	3	1	2			2	1
013 COLTANO	IT	A	9	M9	A24	1	1	2	1		3	2
014 DANNHFLS	GE	A	19	M19	A20	1					2	
015 DARNSTDT	GE	A	28	M28	A21	1					1	
016 DNRMSBG	GE	A	21	M21	A19	1	1	2	1		4	
017 DNRMSBG	GE	A	22	M22	A27	2	1	2	1		6	
018 DRBNDRHH	GE R	A	29	M29	A16	1					2	
019 DRCKRMBG	GE R	A	31	M31	A29	1					2	
020 DUENSEN	GE R	A	30	M30	A31	1					2	
021 EUSKRCHN	GE	A	29	M29	A16	1					1	
022 FRANKFT	GE	A	28	M28	A21	2	1	2	1		4	1
023 FRIOLZHM	GE	A	24	M24	A25	1					4	
024 GABLINGM	GE	A	25	M25	A26	1					1	
025 GARLSTDT	GE	A	30	M30	A31	1					3	2
026 GEIGNUNG	GE	A	26	M26	A28	1					3	
027 GIESSEN	GE	A	29	M29	A16	1					2	
028 GRAFNHR	GE	A	26	M26	A28	1					2	
029 HAMAU	GE	A	28	M28	A21	1					2	
030 HEIDLBRG	GE	A	27	M27	A22	1	1	2	1		2	
031 HEILBRNM	GE	A	24	M24	A25	1					2	
032 HELNSTDT	GE	A	31	M31	A29	1					1	
033 HERONGEN	GE	A	16	M16	A15	1					3	
034 HNPMSBG	GE	A	25	M25	A26	1					2	
035 HOHENFLS	GE	A	26	M26	A28	1					1	
036 HOHNSTDT	GE	A	24	M24	A22	2					4	3
037 KARLSRUH	GE	A	27	M27	A22	1					1	
038 KATTRBCH	GE	A	25	M25	A26	1					2	
039 KONGSTHL	GE	A	27	M27	A22	3					1	
040 KRSLSLRN	GE	A	22	M22	A27	1					2	



TABLE III. (cont'd)

... ARMY TOTALS ...

TABLE IV.

DSNAME: R7065. TRANCOM. EURSEGRE  
 PROJECT ENGINEER: W. J. BONIA  
 DEFENSE COMMUNICATIONS ENGINEERING CENTER: TRANSMISSION ENGINEERING DIVISION; 1860 WIEHLE AVE.; RESTON, VA. 22090-5500  
 TRANSMISSION NETWORK ENGINEERING DIVISION; 1860 WIEHLE AVE.; RESTON, VA. 22090-5500

NAVY SORT OF TRANCOM SEGMENTS IN EUROPE

LATEST REV.: 02/27/85  
PRINTED: 03/07/85

PHONE: AV 364-2164 LOCAL (703) 437-2164  
 TRANSMISSION ENGINEERING DIRECTORATE:

LEGEND: \* STATION HAS MASTER TERM.  
 \* TRANCOM SEGMENT NOS.  
 \* STATION IS REPEATER SITE.  
 \* 3-LETTER STATION ABBREV.  
 \* NO. OF TRANCOM MASTER TERM.  
 \* NO. OF INTELLIGENT REMOTE UNITS  
 \* NO. OF REMOTE DISPLAY TERM.  
 \* FACILITY CONTROL OFFICE  
 \* MOBILE MAINTENANCE TEAM  
 \* NO. OF LSTDN CHANNEL CARDS REQUIRED FOR  
 \* ALTERNATE TNT ACCESS

RMKS: NO. OF LOCATIONS \* 017

STATION NAME	MILDEP	SEG	CODE	TNT NUMBER		# IRU	# TNT	# RDT	FCO	ICO	NMT	TERM	2NDCH
				PRIMARY	BACK-UP								
001 ABERDEEN UK R	M	1	ABE	M1	A2	1						2	
002 AGNAND IT	M	11	AGA	M11	A12	1						1	
003 CAMOLDOL IT	M	11	CAO	M11	A12	2						5	2
004 CAPODCHN IT	M	11	CPO	M11	A12	1						1	
005 EDZELL UK	M	1	ED2	M1	A2	1						1	
006 INVERBRV UK R	M	1	INV	M1	A2	1						2	
007 KATOSQUL GR	M	12	KAO	M12	A11	1					1	2	
008 KINWABER UK R	M	1	KBR	M1	A2	1						2	
009 LAGDPTR IT	M	11	LAG	M11	A12	1						2	
010 LATHERON UK R	M	1	LAT	M1	A2	1						2	
011 LONDON UK	M	6	LDM	M6	A4	1				1		2	
012 WTEPOHEO IT	M	11	EPO	M11	A12	1						2	
013 MURKLE UK	M	1	MKE	M1	A2	1						1	
014 NAPLES IT	M	11	NPS	M11	A12	1	1	2	1			2	1
015 NEAMARRI GR	M	12	NMK	M12	A11	1						1	
016 SIGONELL IT	M	10	SGA	M10	A7	1						2	
017 THURSO UK	M	1	TUS	M1	A2	1	1	2			1	2	1
*** NAVY TOTALS ***						18	2	4	1	1	2	33	6

TABLE V.

DSNAME: R7065, TRANCOM.EURSEGRE AF SORT OF TRANCON SEGMENTS IN EUROPE LATEST REV.: 02/27/85  
 PROJECT ENGINEER: W. J. BONTA CODE: R210 PHONE: AV 364-2164 LOCAL (703) 437-2164 PRINTED: 03/07/85  
 DEFENSE COMMUNICATIONS ENGINEERING CENTER; TRANSMISSION ENGINEERING DIRECTORATE;  
 TRANSMISSION NETWORK ENGINEERING DIVISION; 1860 WIEHLE AVE.; RESTON, VA. 22090-5500

LEGEND: \* - STATION HAS MASTER TERM. R - STATION IS REPEATER SITE  
 \* - TRANCON SEGMENT NOS. CODE - 3-LETTER STATION ABBREV.  
 # IRU # NO. OF INTELLIGENT REMOTE UNITS # TMT # NO. OF TRANCON MASTER TERM.  
 # RDT # NO. OF REMOTE DISPLAY TERM. FCO # FACILITY CONTROL OFFICE  
 ICO # INTERMEDIATE CONTROL OFFICE MNT # MOBILE MAINTENANCE TEAM  
 TERM # NO. OF LINK TERMINATIONS 2NDCH # NO. OF LSTDM CHANNEL CARDS REQUIRED FOR  
 ALTERNATE TMT ACCESS

RMKS: NO. OF LOCATIONS = 136

STATION NAME	MILDEP	SEG	CODE	TMT NUMBER		# IRU	# TMT	# RDT	FCO	ICO	MNT	TERM	2NDCH
				PRIMARY	BACK-UP								
001 ABINGDOM UK	I AF	5	ABN	M5	A3	1						2	
002 ADENAU GE	I AF	19	ANU	M19	A20	1						4	
003 ALCONBRY UK	I AF	3	ANY	M3	A5	1						2	
004 ALENDAG TU	I AF	13	ALE	M13	A14	1						2	
005 ANKARA TU	I AF	14	ANK	M14	A13	1						1	
006 AVIANO IT	I AF	8	AVO	M8	A9	1					1	1	
007 BALKESR TU	I AF	13	BAL	M13	A14	1		2				1	
008 BANN GE	I AF	20	BAN	M20	A23	2						6	
009 BARKWAY UK	I AF	4	BRY	M4	A6	1						4	
010 BASDAHL GE	I AF	30	BAS	M30	A31	1						2	
011 BDUENDR GE	I AF	30	BAN	M30	A31	1						2	
012 BELASI TU	I AF	14	BEB	M14	A13	1						3	
013 BEN ANIM BE R	I AF	18	BNA	M18	A17	1						1	
014 BENSON UK	I AF	5	BSM	M5	A3	1						2	
015 BENTWTRS UK	I AF	2	BNT	M2	A1	1						3	
016 BFDSTJHM UK	I AF	3	BFD	M3	A5	1						1	
017 BITBURG GE	I AF	17	BIG	M17	A18	1						2	
018 BOTLYHLL UK	I AF	6	BFM	M6	A4	1						4	
019 BOVINGDM UK R	I AF	4	BOV	M4	A6	1						2	
020 BRANDHOF GE R	I AF	26	BDH	M26	A28	1						2	
021 BRIZNRTM UK	I AF	3	BZN	M3	A5	1						2	
022 CAKHAKLI TU	I AF	13	CKA	M13	A14	1						1	
023 CALTAGRM IT	I AF	10	CAL	M10	A7	1						2	
024 CHATHAM UK	I AF	6	CHM	M6	A4	1						3	
025 CHCKSNDK UK	I AF	4	CKS	M4	A6	1						2	
026 CHELVSTM UK R	I AF	3	CHV	M3	A5	1						2	
027 CINAGLIM IT	I AF	9	CIN	M9	A24	1						2	
028 COLCHSTR UK	I AF	2	CHR	M2	A1	1						2	
029 COLDBLOW UK	I AF	6	CDW	M6	A4	1						3	
030 COMISO IT	I AF	10	COM	M10	A7	1						1	
031 CORLU TU	I AF	13	CRL	M13	A14	1						1	
032 CROUGHTM UK *	I AF	3	CRO	M3	A5	1		2				4	
033 CRSHSCM UK	I AF	5	CRS	M5	A3	1						4	
034 DANHE GE R	I AF	15	DNE	M15	A30	1						2	
035 DAVENTRY UK R	I AF	3	DAV	M3	A5	1						2	
036 DIYABKR TU	I AF	14	DIV	M14	A13	2						4	
037 DIYABKR TU	I AF	14	TGS	M14	A13	1						1	
038 DOTLINGM GE R	I AF	30	DOT	M30	A31	1						2	
039 DUNKIRK UK	I AF	6	DNK	M6	A4	1						2	
040 ELMADAG TU *	I AF	14	DAG	M14	A13	2		2				6	

TABLE V. (cont'd)

[illegible]

TABLE V. (cont'd)

\*\*\* AF TOTALS \*\*\*

TABLE VI. TRAMCON PRIMARY AND BACKUP TMT LOCATIONS

<u>Segment</u> <u>No.</u>	<u>Primary</u>	<u>Master Location</u> <u>Backup</u>	<u>FCO</u>	<u>ICO*</u>	<u>Remarks</u>
1	Thurso	Martlesham Heath			
2	Martlesham Heath	Thurso		x	
3	Croughton	Hillingdon		x	2 TMTs at Hillingdon
4	Mildenhall	Hillingdon		x	
5	Hillingdon	Croughton	x		
6	Hillingdon	Mildenhall	x		
7	Torrejon	Mt. Vergine	x		
8	Aviano	Coltano	x		
9	Coltano	Vaihingen	x		
10	Mt. Vergine	Torrejon	x		
11	Naples	Hellenikon	x		
12	Hellenikon	Naples	x		
13	Sahin Tepesi	Elmadag		x	
14	Elmadag	Sahin Tepesi	x		
15	Kalkar	Bremerhaven			
16	Brueggen	Kalkar			
17	Schoenfeld	Chievres	x		
18	Chievres	Schoenfeld			
19	Hahn	Ramstein			
20	Ramstein	Pirmasens	x		
21	Donnersberg	Hahn		x	2 TMTs at Donnersberg
22	Donnersberg	Heidelberg		x	
23	Pirmasens	Coltano	x		
24	Vaihingen	Reese Augsburg	x		
25	Reese Augsburg	Nuerenberg	x		
26	Nuernberg	Frankfurt			
27	Heidelberg	Donnersberg	x		
28	Frankfurt	Donnersberg	x		
29	Feldberg	Brueggen		x	
30	Bremerhaven	Berlin	x		
31	Berlin	Feldberg	x		

\* Other ICOs are: London  
 Mt. Venda  
 Mt. Corna  
 Mt. Limbara  
 Martina Franca  
 Langerkopf  
 Mt. Pateras  
 Muhl

## VII. UNINSTALLED EQUIPMENT COST (\$K)

The uninstalled equipment costs for the major TRAMCON items are based on the following per unit planning costs. These are subject to change, especially for the IRU which is scheduled for contract award in March 1985.

<u>Unit</u>	<u>Cost</u>
TMT	\$105.0
IRU	22.0
RDT	11.0
LSTDM 2nd Channel	0.5

TABLE VII. UNINSTALLED EQUIPMENT COST (\$K) - 31 SEGMENTS

<u>Unit</u>	<u>Quantity</u>	<u>Total</u>
TMT	31	\$3255
IRU	243	5346
RDT	63	693
LSTDM 2nd Channel	118	59
Total		\$9353

TABLE VIII. UNINSTALLED EQUIPMENT COST (\$K) - MILDEPs

<u>Unit</u>	<u>Army</u>		<u>Navy</u>		<u>Air Force</u>		<u>Totals</u>
	<u>Qty</u>	<u>Cost</u>	<u>Qty</u>	<u>Cost</u>	<u>Qty</u>	<u>Cost</u>	
TMT	13	\$1365	2	\$210	16	\$1680	\$3255
IRU	77	1694	18	396	148	3256	5346
RDT	26	286	4	44	33	363	693
LSTDM 2nd Ch	26	13	6	3	86	43	59
Total		\$3358		\$653		\$5342	\$9353

TABLE IX. UNINSTALLED EQUIPMENT COST BY COUNTRY (\$K)

<u>Unit</u>	<u>BELGIUM</u>		<u>GERMANY</u>		<u>GREECE</u>		<u>ITALY</u>		<u>NL</u>		<u>SPAIN</u>		<u>TURKEY</u>		<u>UK</u>		<u>Total</u>
	<u>Qty</u>	<u>Cost</u>	<u>Qty</u>	<u>Cost</u>	<u>Qty</u>	<u>Cost</u>	<u>Qty</u>	<u>Cost</u>	<u>Qty</u>	<u>Cost</u>	<u>Qty</u>	<u>Cost</u>	<u>Qty</u>	<u>Cost</u>	<u>Qty</u>	<u>Cost</u>	
TMT	1	\$105	16	\$1680	1	\$105	4	\$ 420	0	0	1	\$105	2	\$210	6	\$ 630	\$3255
IRU	12	264	109	2398	8	176	27	594	6	132	6	132	29	638	46	1012	5346
ROD	3	33	32	352	2	22	8	88	0	0	2	22	4	44	12	132	693
2nd Ch	11	5.5	35	17.5	8	4	24	12	0	0	10	5	4	2	26	13	59
TOTAL		\$407.5		\$4447.5		\$307		\$1114		\$132		\$264		\$894		\$1787	\$9353



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## LIST OF ACRONYMS

DACE	Data Acquisition and Control Element
DCS	Defense Communications System
DEB	Digital European Backbone
DRAMA	Digital Radio and Multiplex Acquisition
EFAS	Enhanced Fault Alarm System
EURSEGRD	Europe Segmentation Data Base, Revision D
EURSEGRE	Europe Segmentation Data Base, Revision E
FCO	Facility Control Office
ICO	Intermediate Control Office
IRU	Intelligent Remote Unit
LDT	Local Display Terminal
LSTDM	Low Speed Time Division Multiplexer
RDT	Remote Display Terminal
SCC	Shape Command Center
TCF	Technical Control Facility
TMT	TRAMCON Master Terminal
TRAMCON	Transmission Monitoring and Control

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